

SEQUENCE LISTING

<110> The Trustees of the University of Pennsylvania
 Stedman, Hansell
 Su, Leonard
 Mitchell, Marilyn

<120> Microutrophin and Uses Thereof

<130> UPN-Q3355PCT

<150> US 60/538,877

<151> 2004-01-23

<160> 12

<170> PatentIn version 3.3

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Gly Lys Pro Pro Ile Asn Asp Met Phe Thr Asp Leu Lys Asp Gly Arg
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Lys Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Thr Ser Leu Pro Lys
65 70 75 80

Glu Arg Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Arg Val
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Leu Gln Val Leu His Gln Asn Asn Val Asp Leu Val Asn Ile Gly Gly
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Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Leu Trp
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Ser Ile Ile Leu His Trp Gln Val Lys Asp Val Met Lys Asp Val Met
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Ser Asp Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
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Arg Gln Ser Thr Arg Pro Tyr Ser Gln Val Asn Val Leu Asn Phe Thr
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 225 230 235 240
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 Pro Pro Pro Pro Pro Lys Lys Arg Gln Ile Pro Val Asp Leu Glu Lys
 Page 5

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 740 745 750
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 Ala Glu Lys Trp Asn Arg Leu Leu Met Ser Leu Glu Glu Leu Ile Lys
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 Gly Asp Val Pro Ala Leu Gln Leu Gln Tyr Asp His Cys Lys Ala Leu
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Lys Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Thr Ser Leu Pro Lys
65 70 75 80

Glu Arg Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Arg Val
85 90 95

Leu Gln Val Leu His Gln Asn Asn Val Glu Leu Val Asn Ile Gly Gly
100 105 110

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Leu Trp
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Ser Ile Ile Leu His Trp Gln Val Lys Asp Val Met Lys Asp Val Met
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Page 16

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 Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp Gln
 580 585 590
 Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala Asp
 595 600 605
 Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys Gln
 610 615 620
 Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr Glu
 625 630 635 640
 Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln Lys
 645 650 655
 Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Val Thr Thr Thr Gln
 660 665 670
 Pro Ser Leu Thr Gln Thr Thr Val Met Glu Thr Val Thr Thr Val Thr
 675 680 685
 Thr Arg Glu Gln Ile Leu Val Lys His Ala Gln Glu Glu Leu Pro Pro
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Leu Ser Ile Pro Gln Leu Ser Val Thr Asp Tyr Glu Ile Met Glu Gln
 965 970 975
 Arg Leu Gly Glu Leu Gln Ala Leu Gln Ser Ser Leu Gln Glu Gln Gln
 980 985 990
 Ser Gly Leu Tyr Tyr Leu Ser Thr Thr Val Lys Glu Met Ser Lys Lys
 995 1000 1005
 Ala Pro Ser Glu Ile Ser Arg Lys Tyr Gln Ser Glu Phe Glu Glu
 1010 1015 1020
 Ile Glu Gly Arg Trp Lys Lys Leu Ser Ser Gln Leu Val Glu His
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 Cys Gln Lys Leu Glu Glu Gln Met Asn Lys Leu Arg Lys Ile Gln
 1040 1045 1050
 Asn His Ile Gln Thr Leu Lys Lys Trp Met Ala Glu Val Asp Val
 1055 1060 1065
 Phe Leu Lys Glu Glu Trp Pro Ala Leu Gly Asp Ser Glu Ile Leu
 1070 1075 1080
 Lys Lys Gln Leu Lys Gln Cys Arg Leu Leu Val Ser Asp Ile Gln
 1085 1090 1095
 Thr Ile Gln Pro Ser Leu Asn Ser Val Asn Glu Gly Gly Gln Lys
 1100 1105 1110
 Ile Lys Asn Glu Ala Glu Pro Glu Phe Ala Ser Arg Leu Glu Thr
 1115 1120 1125
 Glu Leu Lys Glu Leu Asn Thr Gln Trp Asp His Met Cys Gln Gln
 1130 1135 1140
 Val Tyr Ala Arg Lys Glu Ala Leu Lys Gly Gly Leu Glu Lys Thr
 1145 1150 1155
 Val Ser Leu Gln Lys Asp Leu Ser Glu Met His Glu Trp Met Thr
 1160 1165 1170
 Gln Ala Glu Glu Glu Tyr Leu Glu Arg Asp Phe Glu Tyr Lys Thr
 1175 1180 1185
 Pro Asp Glu Leu Gln Lys Ala Val Glu Glu Met Lys Arg Ala Lys
 1190 1195 1200

Glu Glu Ala Gln Gln Lys Glu Ala Lys Val Lys Leu Leu Thr Glu
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 Ser Val Asn Ser Val Ile Ala Gln Ala Pro Pro Val Ala Gln Glu
 1220 1225 1230
 Ala Leu Lys Lys Glu Leu Glu Thr Leu Thr Thr Asn Tyr Gln Trp
 1235 1240 1245
 Leu Cys Thr Arg Leu Asn Gly Lys Cys Lys Thr Leu Glu Glu Val
 1250 1255 1260
 Trp Ala Cys Trp His Glu Leu Leu Ser Tyr Leu Glu Lys Ala Asn
 1265 1270 1275
 Lys Trp Leu Asn Glu Val Glu Phe Lys Leu Lys Thr Thr Glu Asn
 1280 1285 1290
 Ile Pro Gly Gly Ala Glu Glu Ile Ser Glu Val Leu Asp Ser Leu
 1295 1300 1305
 Glu Asn Leu Met Arg His Ser Glu Asp Asn Pro Asn Gln Ile Arg
 1310 1315 1320
 Ile Leu Ala Gln Thr Leu Thr Asp Gly Gly Val Met Asp Glu Leu
 1325 1330 1335
 Ile Asn Glu Glu Leu Glu Thr Phe Asn Ser Arg Trp Arg Glu Leu
 1340 1345 1350
 His Glu Glu Ala Val Arg Arg Gln Lys Leu Leu Glu Gln Ser Ile
 1355 1360 1365
 Gln Ser Ala Gln Glu Thr Glu Lys Ser Leu His Leu Ile Gln Glu
 1370 1375 1380
 Ser Leu Thr Phe Ile Asp Lys Gln Leu Ala Ala Tyr Ile Ala Asp
 1385 1390 1395
 Lys Val Asp Ala Ala Gln Met Pro Gln Glu Ala Gln Lys Ile Gln
 1400 1405 1410
 Ser Asp Leu Thr Ser His Glu Ile Ser Leu Glu Glu Met Lys Lys
 1415 1420 1425
 His Asn Gln Gly Lys Glu Ala Ala Gln Arg Val Leu Ser Gln Ile
 1430 1435 1440

Asp Val Ala Gln Lys Lys Leu Gln Asp Val Ser Met Lys Phe Arg
 1445 1450 1455
 Leu Phe Gln Lys Pro Ala Asn Phe Glu Leu Arg Leu Gln Glu Ser
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 Lys Met Ile Leu Asp Glu Val Lys Met His Leu Pro Ala Leu Glu
 1475 1480 1485
 Thr Lys Ser Val Glu Gln Glu Val Val Gln Ser Gln Leu Asn His
 1490 1495 1500
 Cys Val Asn Leu Tyr Lys Ser Leu Ser Glu Val Lys Ser Glu Val
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 Glu Met Val Ile Lys Thr Gly Arg Gln Ile Val Gln Lys Lys Gln
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 Thr Lys Arg Ser Ala Val Glu Gly Met Pro Ser Asn Leu Asp Ser
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 Lys Val His Leu Lys Ser Ile Thr Glu Val Gly Glu Ala Leu Lys
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 Thr Val Leu Gly Lys Lys Glu Thr Leu Val Glu Asp Lys Leu Ser
 1640 1645 1650
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 1655 1660 1665
 Trp Leu Asn Leu Leu Leu Glu Tyr Gln Lys His Met Glu Thr Phe
 1670 1675 1680
 Asp Gln Asn Val Asp His Ile Thr Lys Trp Ile Ile Gln Ala Asp

1685	1690	1695
Thr Leu 1700	Leu Asp Glu Ser Glu 1705	Lys Lys Lys Pro Gln 1710
Asp Val 1715	Leu Lys Arg Leu Lys 1720	Ala Glu Leu Asn Asp 1725
Lys Val 1730	Asp Ser Thr Arg Asp 1735	Gln Ala Ala Asn Leu 1740
Arg Gly 1745	Asp His Cys Arg Lys 1750	Leu Val Glu Pro Gln 1755
Leu Asn 1760	His Arg Phe Ala Ala 1765	Ile Ser His Arg Ile 1770
Lys Ala 1775	Ser Ile Pro Leu Lys 1780	Glu Leu Glu Gln Phe 1785
Ile Gln 1790	Lys Leu Leu Glu Pro 1795	Leu Glu Ala Glu Ile 1800
Val Asn 1805	Leu Lys Glu Glu Asp 1810	Phe Asn Lys Asp Met 1815
Asn Glu 1820	Gly Thr Val Lys Glu 1825	Leu Leu Gln Arg Gly 1830
Gln Gln 1835	Arg Ile Thr Asp Glu 1840	Arg Lys Arg Glu Glu 1845
Lys Gln 1850	Gln Leu Leu Gln Thr 1855	Lys His Asn Ala Leu 1860
Arg Ser 1865	Gln Arg Arg Lys Lys 1870	Ala Leu Glu Ile Ser 1875
Tyr Gln 1880	Tyr Lys Arg Gln Ala 1885	Asp Asp Leu Leu Lys 1890
Asp Ile 1895	Glu Lys Lys Leu Ala 1900	Ser Leu Pro Glu Pro 1905
Arg Lys 1910	Ile Lys Glu Ile Asp 1915	Arg Glu Leu Gln Lys 1920
Glu Leu 1925	Asn Ala Val Arg Arg 1930	Gln Ala Glu Gly Leu 1935

Gly Ala Ala Met Ala Val Glu Pro Thr Gln Ile Gln Leu Ser Asp
 1940 1945 1950
 Arg Trp Arg Glu Ile Glu Ser Lys Phe Ala Gln Phe Arg Arg Leu
 1955 1960 1965
 Asn Phe Ala Gln Ile His Thr Val Arg Glu Glu Thr Met Met Val
 1970 1975 1980
 Met Thr Glu Asp Met Pro Leu Glu Ile Ser Tyr Val Pro Ser Thr
 1985 1990 1995
 Tyr Leu Thr Glu Ile Thr His Val Ser Gln Ala Leu Leu Glu Val
 2000 2005 2010
 Glu Gln Leu Leu Asn Ala Pro Asp Leu Cys Ala Lys Asp Phe Glu
 2015 2020 2025
 Asp Leu Phe Lys Gln Glu Glu Ser Leu Lys Asn Ile Lys Asp Ser
 2030 2035 2040
 Leu Gln Gln Ser Ser Gly Arg Ile Asp Ile Ile His Ser Lys Lys
 2045 2050 2055
 Thr Ala Ala Leu Gln Ser Ala Thr Pro Val Glu Arg Val Lys Leu
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 Gln Glu Ala Leu Ser Gln Leu Asp Phe Gln Trp Glu Lys Val Asn
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 Lys Trp Arg Arg Phe His Tyr Asp Ile Lys Ile Phe Asn Gln Trp
 2105 2110 2115
 Leu Thr Glu Ala Glu Gln Phe Leu Arg Lys Thr Gln Ile Pro Glu
 2120 2125 2130
 Asn Trp Glu His Ala Lys Tyr Lys Trp Tyr Leu Lys Glu Leu Gln
 2135 2140 2145
 Asp Gly Ile Gly Gln Arg Gln Thr Val Val Arg Thr Leu Asn Ala
 2150 2155 2160
 Thr Gly Glu Glu Ile Ile Gln Gln Ser Ser Lys Thr Asp Ala Ser
 2165 2170 2175

Ile Leu Gln Glu Lys Leu Gly Ser Leu Asn Leu Arg Trp Gln Glu
 2180 2185 2190
 Val Cys Lys Gln Leu Ser Asp Arg Lys Lys Arg Leu Glu Glu Gln
 2195 2200 2205
 Lys Asn Ile Leu Ser Glu Phe Gln Arg Asp Leu Asn Glu Phe Val
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 Leu Trp Leu Glu Glu Ala Asp Asn Ile Ala Ser Ile Pro Leu Glu
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 Pro Gly Lys Glu Gln Gln Leu Lys Glu Lys Leu Glu Gln Val Lys
 2240 2245 2250
 Leu Leu Val Glu Glu Leu Pro Leu Arg Gln Gly Ile Leu Lys Gln
 2255 2260 2265
 Leu Asn Glu Thr Gly Gly Pro Val Leu Val Ser Ala Pro Ile Ser
 2270 2275 2280
 Pro Glu Glu Gln Asp Lys Leu Glu Asn Lys Leu Lys Gln Thr Asn
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 Ser Pro Ile Arg Asn Gln Leu Glu Ile Tyr Asn Gln Pro Asn Gln
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 Gly Ala Ser Pro Thr Gln Thr Val Thr Leu Val Thr Gln Pro Val
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 Val Thr Lys Glu Thr Ala Ile Ser Lys Leu Glu Met Pro Ser Ser
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 Thr Glu Leu Thr Asp Trp Leu Ser Leu Leu Asp Gln Val Ile Lys
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 Ser Gln Arg Val Met Val Gly Asp Leu Glu Asp Ile Asn Glu Met
 2495 2500 2505
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 Lys Thr Ser Asn Gln Glu Ala Arg Thr Ile Ile Thr Asp Arg Ile
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 Leu His Arg Leu Arg Gln Leu Leu Glu Gln Pro Gln Ala Glu Ala
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 <213> artificial

<220>
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<400> 12
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24